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INFORMATION ON THE BOOK "CRYSTAL DETECTORS" (RUSSIAN  
TRANSLATION OF US BOOK)

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Source: Kristallicheskiye Detektory (Part I of two parts)  
Translation of the US Book "Crystal Rectifiers"  
Published by "Sovetskoye Radio"

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**CONFIDENTIAL****SECURITY INFORMATION****INFORMATION ON THE BOOK "CRYSTAL DETECTORS"****(RUSSIAN TRANSLATION OF US BOOK)**

The Russian book "Crystal Detectors" (Kristallicheskiye Detektory) is a translation by Engr. K. E. Viller (under the editorship of Ye. Ya. Pumper) of the US book "Crystal Rectifiers" by Torrey and Whitmer, which is one of the high-level scientific books published in the so-called MIT Radiation Laboratory Series (McGraw-Hill).

"Due to the large volume of material covered in the book," the Russian edition was published in two parts with certain supplementary sections added as indicated below. The book was published in 1950 by "Sovetskoye Radio" Publishing House in Moscow. Only Part I, which consists of 331 pages and sells for 16 rubles, is covered in this report.

Part I is a translation of the following original chapters of the MIT book, in the order indicated (Russian chapters are shown in parenthesis where they differ from the original English ones):

Chapters 1, 2, 3, 4, 12(5), 13(6), 15(7) and Appendices A, B, C, D, (same as original).

It is stated in the preface that a translation of the following two chapters from "Microwave Mixers" by Pound (also of the MIT Radiation Laboratory Series) was included in the Russian edition to afford the reader a better understanding of the subject matter:

- 1) "Circuits for Simple Microwave Mixers"
- 2) "Balancing Circuits"

Apparently included in Part II of translation<sup>7</sup>.

In addition, the editor has included two supplements written by the Russian scientist, A. V. Rzhakov, in order to clarify the role played by Russian science in the development of crystal rectifiers. A brief summary of certain parts of these supplements is presented below.

~~Supplement 1 (pp. 253-279) contains a summary of the state of the art of rectification in crystal detectors.~~

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SUPPLEMENT I (pp 253-279) -- Contemporary Views on the Nature of Rectification in Crystal Detectors.1. Brief Survey of Soviet Research on Semiconductors.

[The reader is referred to the following articles for a more detailed survey of Soviet work in this field: A. F. Ioffe -- "Electron Semiconductors" Izvestiya Akad Nauk SSSR, Ser. Fiz. Vol 10, No 1, 1946, p. 3, or Elektrichestvo, No 1, 1946, p 3; B. Davydov -- Uspekhi Fiz. Nauk, Vol 33, No 2, 1947, p. 1577.

Summary

Early developments in the use of the crystal detector began with A. S. Popov's experiments at the turn of the century. This was followed by studies on the properties of native, crystal semiconductors by O. V. Losev in the 1920's. Extensive and systematic investigations of semiconductors were begun in the 1930's by a group of researchers under the leadership of A. F. Ioffe. Researchers working in this field during the 1930's included the following: Ya. I. Frenkel', B. V. Kurchatov, V. P. Zhuze, B. M. Gokhberg, M. S. Sominskiy, A. N. Arsen'yeva, Yu. P. Maslakovets, Ye. D. Devyatкова, L. D. Landau, A. Kompaneyets, B. P. Davydov, F. F. Vol'kenshteyn, A. V. and A. F. Ioffe, S. P. Pekar, D. M. Blokhintsev, Kh. I. Amurkhanov, and O. V. Losev.

S. P. Pekaar first developed the theory of contact layers (Zh E T F, No. 9, 1939, p. 534; 1940, p. 1210), which was also developed, somewhat later, by Schottky (Zs. f. Phys., 367, 1939) and Mott (Proc. of Cambr. Soc. 34, 568, 1938). This laid the foundation for the development of crystal detectors.

V. Ye. Loshkarev carried out basic studies on barrier-layer cells (Izvestiya Akad. Nauk SSSR, Ser. Fiz., Vol 5, No 4-5, pp. 442 and 478). B. P. Davydov also contributed some basic ideas on the theory of rectification (concurrently with similar work by Schottky) which were later verified experimentally by other researchers.

All of these basic research studies were later used in the development of the theory of rectification of germanium and silicon detectors in 1947-49.

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2. Verification of Theoretical Proposals in the Case of Point-Contact Silicon and Germanium Detectors.
3. Conductivity of Germanium Having High Inverse Voltage in Dependence on Field Intensity.
4. Conductivity of Point Contacts of Metal With a Surface of Germanium. The Role of Holes.
5. Conclusions.  
(Reviews basic developments)  
[Bibliography lists 38 items, the early entries being predominantly Russian, while 16 of the last 17 items refer to Western works].

SUPPLEMENT II. CRYSTAL AMPLIFIERS (pp 280-311)

Amplification and Generation Using the Negative-Resistance Portion of the Detector Characteristic.

Crystal Triode\* (Transistor)

\*[Author notes that the term "transistor" is not entirely suitable and that the term "crystal triode" is more appropriate].

1. Description and Principle of Operation.
2. Characteristics of the Crystal Triode.
3. Theoretical Investigation of Certain Characteristics of the Crystal Triode.
4. Circuit Connections for the Crystal Triode as an Amplifier and Oscillator.
5. Conclusions.

Author concludes by noting that although his supplement touched upon practically all works published on transistors, many problems remain to be solved. This is understandable in view of the short time transistors have been publicized (first published works in the latter half of 1948).

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The most serious shortcoming of transistors is considered to be the high noise level, a problem which so far has not been treated to any extent in open literature. If it turns out that the high noise level can be reduced, rather than being an inherent quality of transistors, the possible applications of transistors will be greatly expanded.

Bibliography (16 items)

[The first 7 items are various articles by O. V. Losev dating from 1922-1927. The remaining articles are by Western scientists, namely: Benzer, Bardeen, Brattain, Lenovec, Shive, Pfann, Scaff, Webster, Eberhard and Borton.

In view of the above, it is doubtful that Supplement II contains any information of intelligence or scientific interest.<sup>7</sup>

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